Integrated Data Management Concept of Operations (CONOPS) For Littoral Combat Ship Mission Modules Program

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Table of Contents

Table of Figures

1 Executive Summary

The S1000D Bridge Tool Set is a suite of capabilities funded by the Office of the Under Secretary of Defense for Acquisition, Technology & Logistics (OUSD/AT&L) as a DoD Reduction in Total Ownership Cost (R-TOC) initiative[1]. It answers a 2009 Naval Inspector General's report, which highlighted that the Navy does not have a centralized governance model for the development and life cycle management of training content. S1000D provides a program's key enabler in acquiring and managing all operation, maintenance and related training source data in a common environment based on Integrated Logistics Support (ILS).

This CONOPS is a business model for the acquisition, development and life cycle management of integrated data used in technical publications and Interactive Multimedia Instruction products[2]. It describes business rules, use cases, process requirements, and illustrates how the S1000D™ Bridge Tool Set shall be used to support them. S1000D is an industry-based standard used to develop and manage technical documentation and training data in a common source database.

Programs shall use this document to develop the "Technical Documentation" and "Training" components of their Life Cycle Support Plans (LCSP) in accordance with DoD Instruction 5000.02 acquisition process requirements. Programs shall use the processes to complement eXtensible Markup

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[1] This R-TOC S1000D-SCORM Bridge Project originated as an R-TOC project initiative in 2009, with the strategic vision and technical development strategy defined in a report entitled, "A Technical Development Strategy for Bridging S1000D and SCORM" (dated February 2009).

[2] IMI is the blanket term used in DoDi 1322.26 for training content delivered via distance learning methods, which include Interactive Courseware (ICW), Computer-Based Training (CBT), Web-Based Training (WBT), Electronic Performance Support System (EPSS), Computer Aided Instruction (CAI), Computer Managed Instruction (CMI), and electronic job aids.

Language (XML) policy requirements for technical manuals (NAVAIR INST 4120.11, NAVSEAINST 4160.3A), the Defense Acquisition Guidebook, Data Sharing in a DoD Net-Centric Environment (8320.02) and Digital Learning Content policy requirements for military training (DoD Instruction 1322.26).

2 Introduction

This CONOPS document delivers a practical "how-to" guide for aligning with specific DoD acquisition system requirements (refer to Appendix B - Department of Navy Policy Implementation) but it provides enough flexibility to accommodate a program's local requirements and business practices. The business rules, scenarios and processes in this CONOPS provide Product Support Managers with a framework of discrete tasks and measurable requirements to acquire and develop all technical source data in a common digital environment, and manage that data under a standardized, metadata-based configuration management protocol. It also explains how to use the S1000D Bridge Tool Set to integrate the development, management and delivery of training content with technical documentation production processes using an S1000D Common Source Database (CSDB). For example, components of the S1000D Bridge Tool Set include a vendor-neutral Application Programming Interface (API) to enable data exchange between training content development tools and a CSDB, and a transformation toolkit that allows SCORM-conformant training content packages to be created directly from a CSDB.

The policies and best practices established in this document shall apply to all Naval Sea Systems Command (NAVSEA) and Naval Air Systems Command (NAVAIR) activities responsible for the acquisition, development and life cycle maintenance of technical manuals, maintenance information, test and evaluation data, parts lists, job duty task

analyses, learning objectives, personal qualification standards, lesson plans, trainee guides, test materials, and digital learning content to support automated information and weapon systems procurement within the Littoral Combat Ship Mission Modules Program.

Program life cycle savings will be realized by minimizing or eliminating the following factors, which are identified as significant labor cost drivers associated with historical technical data / digital training content acquisition and life cycle management practices.

1) Redundant content production due to the inability to share and link technical content between technical data and training content production organizations.
2) Inconsistency between technical documentation and training content provided to operation and maintenance personnel due to poor or non-existent configuration management processes for training content/assets, which results in increased labor hours for workers on their job tasks or additional hours of training that could have been avoided.
3) Slow, manual assessments of the impacts an engineering change will have on deployed technical data (e.g., documentation) and training content, which results in:
    a. Unexpected additional or hidden costs that might influence the decision to seek an alternative engineering course of action.
    b. Incomplete assessments due to content being dispersed across multiple databases and organizations.
    c. Untimely or lagging delivery of up-to-date technical data / training content to affected operator and maintenance personnel.

3 Integrated Data Management System Architecture

This section defines the components and significant key enablers required to create an integrated data management system that will harmonize the organizations, processes and tools used to develop and manage technical documentation and training content. When planning an acquisition's life cycle management system, new contractual requirements shall be established with the purpose of integrating the planning, analysis, production and maintenance of data used for technical documentation and training content. Specialty groups will be maintained but the personnel, processes and assets of such groups that are traditionally engaged and segregated until late in the life cycle shall be made seamless through joint planning activities, establishment of common business rules (including metadata tagging and maintenance) and centralization of content development within a CSDB.

An historical system overview of segregated technical documentation and training content development processes and personnel is provided in Appendix C - Content Development Systems Prior to CONOPS Implementation.

3.1 Overview

Technical documentation and training content development processes and personnel shall be coordinated through shared business rules and standardized Application Programming Interfaces (APIs) that centralize content development, management and publication activities through an S1000D CSDB. As illustrated in Figure 1, an integrated data management system shall be created in which objects residing in an S1000D CSDB can be viewed, modified or created via non-proprietary content authoring applications.
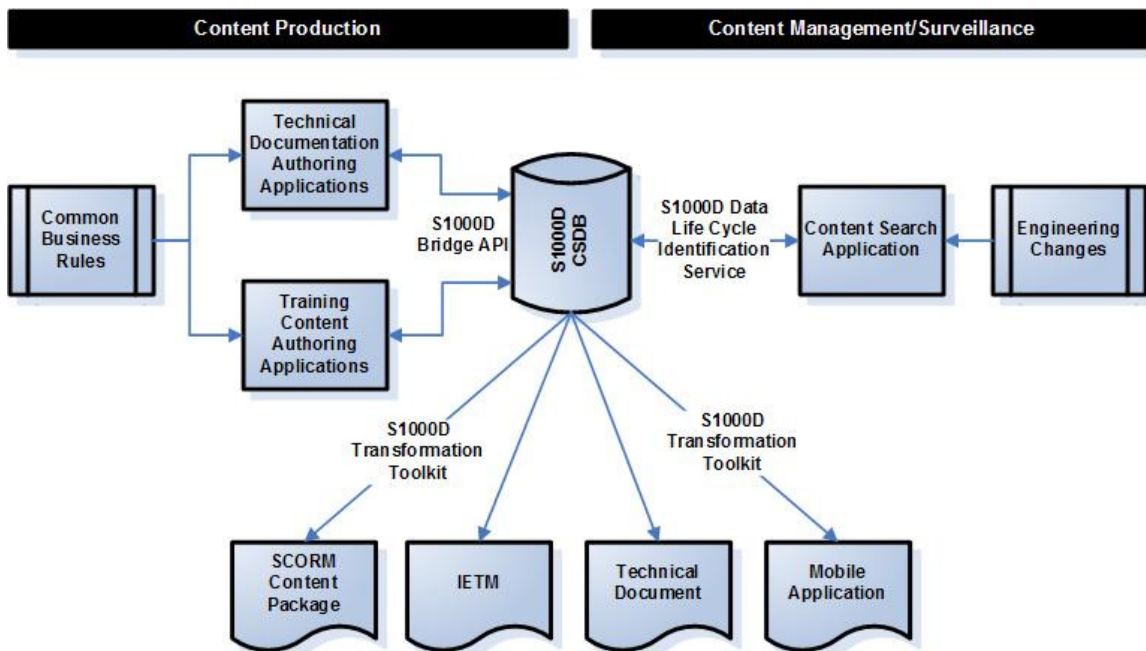
Figure 1: Integrated Technical Documentation and Training Content Production and Management System

Connections to the CSDB shall be established and executed in accordance with the S1000D Bridge API so that any DoD network-approved government or commercial content development application may seamlessly access the CSDB environment. The S1000D Transformation Toolkit shall be used to generate standardized output formats for digital training content. For example, the S1000D Transformation Toolkit shall be used to create SCORM-compliant content packages for delivery via a Learning Management System (LMS). It may also be used to create training or technical documentation applications for delivery on mobile devices.

As the life cycle progresses and system engineering changes are identified, content residing in the CSDB shall be searched using the S1000D Data Life Cycle Identification Service. DoD network-approved government or commercial content search applications shall use this web service to locate all affected technical documentation and training content.

Additional detail about the Integrated Data Management System is defined in this CONOPS in Appendix D - Detailed Description of Integrated Data Management System Architecture.

3.2 Key System Enablers

3.2.1 Centralized S1000D CSDB

A centralized S1000D CSDB shall be used for technical documentation and training content development and management. In the case of NAVAIR LCS MM program support, the Navy's CSDB maintained by NATEC in San Diego, CA shall be used for the production of data modules and learning data modules. NAVSEA LCS MM program support shall use the Navy's CSDB maintained at NAVSESS in Philadelphia, PA.

Instead of multiple local instances of S1000D CSDBs being used at geographically dispersed field sites, all Navy personnel and contractors developing, reviewing, editing or maintaining data modules shall have accounts established with either NATEC (for NAVAIR-owned systems and equipment) or NAVSESS (for NAVSEA-owned systems and equipment) in

order to consolidate all technical content and workflow through a single CSDB repository site.

3.2.2 Planning and Authoring Training Content in S1000D LDMs

In accordance with S1000D Issue 4.0, technical data (i.e., text, illustrations, multimedia) produced for training purposes shall be contained in Learning Data Modules (LDM) and managed in the S1000D CSDB. LDMs shall be listed in the project's Data Module Requirements List (DMRL).

LDMs shall be used to plan and define end operator and end maintainer job task requirements, training objectives and training intervention requirements. They shall also be used later in the content development process to capture and catalog training content (including media assets) and assessment (e.g., test questions) item content. All LDMs and DMs shall be linked in the CSDB.

3.2.3 Training Content Authoring Tool Access to S1000D CSDB

Authoring applications used by government and contractor personnel to create curriculum and training content shall connect directly to the designated Navy CSDB. Personnel using these applications shall be able to search, create, and edit DMs and LDMs directly in the CSDB. This capability shall be enabled through the S1000D Bridge API provided as part of the S1000D Bridge Tool Set. The SCO Workbench application shall be provided as GFE to support contractors' development of LDMs, if desired. AIM Content Planning Module (CPM) shall be provided to contractors as GFE to support the development of curriculum learning plan LDMs.

3.2.4 Publishing SCORM Content Packages Using S1000D SCPM

SCORM content packages used to deliver training content via an LMS as part of an LCS MM training system shall be defined using S1000D's SCORM Content Package Module (SCPM). The S1000D-

SCORM Transformation Toolkit shall be made available to contractors as GFE to support the transformation of SCPMs to create SCORM content packages directly from the Navy CSDB.

3.2.5 Automated Content Surveillance

Any time engineering changes are proposed or implemented within an LCS MM program, the technical documentation and training organizations shall use the S1000D Data Life Cycle Identification Service to search the CSDB for potentially impacted DMs and LDMs. System and subsystem identifiers shall be established in accordance with S1000D requirements for data module coding and locally established business rules, which shall serve as the basis for locating affected DMs and LDMs. The S1000D Data Life Cycle Identification Service will automatically search and return a DM/LDM list from the CSDB for development personnel to evaluate.

3.2.6 Joint Technical Documentation and Training Integrated Product Team (TD&T IPT)

LCS MM Product Support Managers shall institute a Joint Technical Documentation and Training Integrated Product Team (TD&T IPT) to support early acquisition strategy planning and analysis activities. Typically, the TD&T IPT will be established during the Technology Development Phase, or at the first activity involving development of the program's Life Cycle Support Plan (LCSP). The TD&T IPT's charter shall be to establish and maintain common business rules, DM/LDM coding, metadata requirements and ensure cooperative development of technical documentation and training content across all life cycle phases.

3.3 Justification for Changes

The system changes support the type of Net-Centric data sharing concepts and practices required under DoD Directive 8320.02. With a CSDB based on industry-accepted standards as the core change, all other system changes enable the horizontal

integration of processes and activities required to optimize two closely related and interdependent components of a life cycle support system. All system changes are designed to close cost-driving gaps caused by segregated but related practices and purposes. When implemented they will help achieve the following objectives:

- Eliminate redundant labor efforts in content development activities.
- Reduce end users' wasted time when learning and/or performing operation and maintenance tasks incorrectly due to misaligned technical documentation and training content.
- Reduce the time required to issue updated technical documentation and training content when a change occurs.

4 Operational Scenarios

The scenarios in this section provide a how-to framework, with key steps for coordinating the personnel, processes and tasks necessary to develop and maintain integrated technical information and training content in a Navy Enterprise CSDB. Use of

the S1000D Bridge Tool Set is explained in each operational scenario through business rules and requirements necessary to maintain a successful integrated technical documentation and training content life cycle system.

There are three operational scenarios:

1. The initial, parallel development of new data modules (DMs) and learning data modules (LDMs) for a new LCS MM program.
2. Modifications to DMs and LDMs as a result of technical documentation and work packages/maintenance procedures validation, or piloting of training courses/materials.
3. Ongoing maintenance and surveillance of DM/LDM content within a CSDB due to engineering upgrades or modifications.

4.1 Scenario 1: Initial Development

This operational scenario consists of a main path, which may branch to and return from the four alternative paths as depicted in Figure 2. In this scenario, new preliminary technical documentation, training requirements and draft training content are produced during either the Engineering &
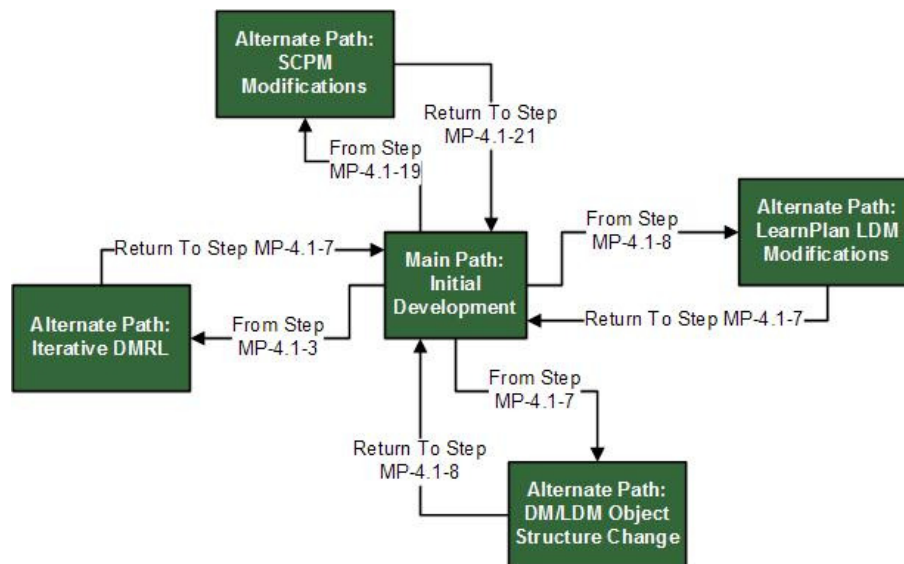

Figure 2: Path Relationship Summary for Operational Scenario 1

Manufacturing Development Phase or Production and Deployment Phase defined by the Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System for a procurement type of contract.

4.1.1 Entry Criteria and Preconditions - Initial Development

Prior to starting the tasks required to produce technical documents and training as an integrated data source, the following documents are expected to have been completed and approved. They are key input documents that define technical documentation and training requirements, and will be needed to guide decisions during planning and development activities.

- Life Cycle Support Plan (LCSP)
- Product Support Package
- Navy Training System Plan (NTSP)
- TMINS Listing for Technical Documents
- Preliminary Baseline Equipment List (PBEL) / Provisioning Parts List (PPL)

4.1.2 Business Rules - Initial Development

4.1.2.1 BR-4.1-01

A common configuration control strategy shall be derived jointly by technical documentation and training groups based on the program's equipment top-down break-down structures. This strategy shall align with established component identifiers, and apply them accordingly to the Standard Numbering System (SNS) portion of an LDM's and DM's Data Module Code (DMC). [3]

4.1.2.2 BR-4.1-02

The Curriculum Design Lead and Instruction Design Lead shall establish the project's strategy for implementing the use of S1000D Learn Codes[4] in the DMC for all LDMs.

4.1.2.3 BR-4.1-03

The required contexts for technical data use in technical documentation and training shall be determined during a program's planning phases. This requires the selection of applicable data types from the S1000D Issue 4.0 specification (i.e., Data Module and Learning Data Module types). It then requires the development of common definitions between technical documentation and training groups for markup elements' meaning and their use in style sheets (either existing or to be developed) for rendering the data to various devices and/or output product formats.

4.1.2.4 BR-4.1-04

Programs shall require all technical documentation and training groups' personnel to use a single, centralized Navy S1000D Issue 4.0[5] CSDB throughout all phases of content production. The Navy CSDB located at NAVSESS Philadelphia shall be used for all NAVSEA LCS MM DM/LDM development. The Navy CSDB located at NATEC San Diego shall be used for NAVAIR LCS MM development. Accounts and user access/privileges shall be established in accordance with the user classes defined in Appendix C of this CONOPS.

4.1.2.5 BR-4.1-05

Media object naming conventions shall be established and based on S1000D Information Control Number (ICN) standards for all files (i.e., source and final media).

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[3] Not all systems developed for LCS will adhere to the maintained SNS described in the S1000D specification. An example is the RMS MM. In such cases, the TD&T IPT must document in the project's business rules how the SNS is developed.

[4] The S1000D specification documentation further describes the use and purpose of "H" and "T" Learn Codes. All LDMs in this context will likely use "T" codes.

[5] Issue 4.1, when available and fully supported.

4.1.2.6 BR-4.1-06

A common metadata dictionary shall be jointly established by technical documentation and training groups based on the Naval Education and Training Command's (NETC) metadata requirements, and in alignment with program-established component identifiers. Programs shall require the population of the Technical and Information Names in the DM/LDM metadata elements.

4.1.2.7 BR-4.1-07

For training development, the Authoring Instructional Materials (AIM) Content Planning Module (CPM) shall provide the reference point for all SCORM Content Package Module (SCPM)[6] and LearnPlan LDMs[7] created in the Navy CSDB. SCPM and LDMs will be created via the AIM CPM application, and transferred via the S1000D-SCORM Bridge API to the Navy CSDB. An SCPM or LearnPlan LDM shall be checked out from the CSDB when updates are being made to the "master" copy managed in the AIM CPM database. There shall be one LearnPlan LDM (S1000D Learn Event Code "A") associated with an SCPM.

4.1.2.8 BR-4.1-08

SCO Workbench is readily available for implementation of the S1000D Bridge API. Therefore, it shall be the preferred training content authoring tool for accessing the Navy CSDB, and performing all LDM training content development tasks (i.e., LDMs with Learn Event Code assignments of B through E).

4.1.2.9 BR-4.1-09

Once a SCORM content package is exported from the Navy CSDB, it enters the Navy e-Learning process for Government Content Acceptance Testing (GCAT) and

hosting on the Navy's Learning Management System. It shall be the Curriculum Designer's and/or Instructional Systems Designer's responsibility to monitor content changes within the Navy CSDB and determine when an updated SCORM content package should be generated to update the Navy's LMS.

4.1.2.10 BR-4.1-10

SCORM content packages generated from the Navy CSDB shall use the S1000D Transformation Toolkit provided in the S1000D Bridge Tool Set.

4.1.2.11 BR-4.1-11

The Instructional Designer shall be responsible for notifying the Curriculum Developer of any changes made to a DMRL that alters the LDM object structure within the Navy CSDB. The Curriculum Developer, upon receiving such notification, shall review the changes and verify alignment with the master Learn Plan maintained in AIM CPM. If necessary, the Curriculum Developer shall update the LearnPlan LDM maintained in the CSDB.

4.1.3 Main Path- Initial Development

Within the main path of this scenario provided in Table 1, technical documentation and training content are developed concurrently. This operational scenario ends at the point in the technical documentation and training development processes where respective products are issued out to the Fleet and/or training center for piloting and validation. The central governing function is the Technical Documentation and Training Integrated Product Team (TD&T IPT), which synchronizes the planning, production processes and products among the two groups.

NOTE: The steps within this operational scenario are not always linear but interrelated or iterative. Furthermore, tailoring may be required due to contractual requirements or other program-unique requirements.

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[6] The S1000D SCPM defines the content and structure of a SCORM content package.

[7] The LearnPlan information model is a branch in the S1000D learning schema that structures content (e.g., objectives) that drives course strategy and development.

Step #	Step Description	Alternate / Exception Path	Relevant Business Rule
MP-4.1-1.	Product Support Manager establishes TD&T IPT, including lead representatives for Technical Documentation and Training Systems.		
MP-4.1-2.	TD&T IPT convenes to plan CSDB architecture based on preliminary analysis of technical documentation list and maintenance and operation training requirements.		BR-4.1-01 BR-4.1-02 BR-4.1-04
MP-4.1-3.	TD&T IPT conducts DM/LDM planning workshop. Output is DMRL.	AP-4.1-01	BR-4.1-06
MP-4.1-4.	TD&T IPT conducts metadata planning workshop. Output is metadata dictionary.		BR-4.1-05
MP-4.1-5.	Navy CSDB Administrator establishes project area within Navy CSDB and sets status of project to "Start Project".		
MP-4.1-6.	Navy CSDB Administrator creates required user accounts and assigns appropriate roles/access privileges to each.		BR-4.1-03
MP-4.1-7.	Project Manager creates DM/LDM objects and sets project's DM/LDM to "Draft Write" stage in Navy CSDB.	AP-4.1-02	
MP-4.1-8.	Training Curriculum Designer loads LearnPlan information, derived from AIM CPM, into Navy CSDB.	AP-4.1-03	BR-4.1-06
MP-4.1-9.	Technical Writers populate DMs and notify Project Manager when complete.		
MP-4.1-10.	Training Content Writers populate LDMs and notify Project Manager when complete.		BR-4.1-07
MP-4.1-11.	Project Manager sets DM status to "Review" stage.		
MP-4.1-12.	Project Manager sets LDM status to "Review" stage.		
MP-4.1-13.	Engineers/Subject Matter Experts review DM/LDM content for technical accuracy.		
MP-4.1-14.	Instructional Designers review LDM content for instructional integrity and ability to support related DM content.		
MP-4.1-15.	Quality Assurance reviews all DM/LDM content for grammar, spelling, etc.		
MP-4.1-16.	Project Manager sets DM/LDM status to "Final Write" project stage in Navy CSDB.		
MP-4.1-17.	Quality Assurance verifies DM/LDM adjudication completed.		
MP-4.1-18.	TMMA creates PM in Navy CSDB.		
MP-4.1-19.	Training Curriculum Designer loads SCPM into Navy CSDB.	AP-4.1-04	BR-4.1-06
MP-4.1-20.	TMMA creates technical documentation products.		
MP-4.1-21.	Programmer creates SCORM content packages for training.		BR-4.1-08 BR-4.1-09
MP-4.1-22.	Project Manager sets project's DM/LDM to "Validation" stage in Navy CSDB.		
MP-4.1-23.	TD&T IPT monitors and collects feedback from customer/end user organization in preparation for Post-Validation revisions.		

Table 1: Operational Scenario 1, Main Path- Initial Development

4.1.3.1 Alternate Paths- Initial Development

AP-4.1-01 - ITERATIVE DMRL

The creation of a complete DMRL, especially all LDMs supporting training requirements, will likely be an iterative and evolutionary process. This alternate path provides a sub-process for handling iterative DMRL planning and updates as a program progresses.

Step #	Step Description	Parent Path Re-entry Point	Relevant Business Rule
AP-4.1-01-1	TD&T IPT conducts DMRL Review Workshop.		BR-4.1-01
AP-4.1-01-2	Training Curriculum Designer checks out all SCPM and LearnPlan LDMs within the project.		BR-4.1-06
AP-4.1-01-3	TD&T IPT reviews current program requirements, engineering changes, etc. and determines delta from last IPT.		
AP-4.1-01-4	TD&T IPT collectively updates DMRL and re-issues to content owners.	MP-4.1-7	

Table 2: Operational Scenario 1, Alternate Path 1- Iterative DMRL

AP-4.1-02 - DM/LDM OBJECT STRUCTURE CHANGES

A project in the Navy CSDB may already be established but changes or additions to a DMRL will require DMs/LDMs to be added to or deleted from the project. This alternate path may be applied at any time within a project where the DM/LDM object structure must be altered in the Navy CSDB.

Step #	Step Description	Parent Path Re-entry Point	Relevant Business Rule
AP-4.1-02-1	Editor/Designer receives updated DMRL approved by TD&T IPT.		
AP-4.1-02-2	Editor/Designer updates DM/LDM object structure in Navy CSDB.		
AP-4.1-02-3	Editor/Designer notifies Training Curriculum Developer LDM object changes made within Navy CSDB.	MP-4.1-8	BR-4.1-10

Table 3: Operational Scenario 1, Alternate Path 2- DM/LDM Object Structure Changes

AP-4.1-03 - LEARNPLAN LDM MODIFICATIONS

In cases where the Training Curriculum Designer modifies LearnPlan LDM information in the Navy CSDB due to changes in training requirements, the following alternate path will be applied. This path is only used when training curriculum changes are initiated by the Training Curriculum Designer (and changes are being made to master copies in AIM CPM).

Step #	Step Description	Parent Path Re-entry Point	Relevant Business Rule
AP-4.1-03-1	Training Curriculum Designer checks out LearnPlan LDM from Navy CSDB prior to changing master copy in AIM CPM database.		
AP-4.1-03-2	Training Curriculum Designer updates LearnPlan data in AIM CPM database.		
AP-4.1-03-3	Training Curriculum Designer transfers and checks in updated LearnPlan LDM in Navy CSDB.		
AP-4.1-03-4	TD&T IPT convenes to analyze impact on DMRL.		
AP-4.1-03-5	TD&T IPT issues updated DMRL, if required.	MP-4.1-7	

Table 4: Operational Scenario 1, Alternate Path 3- LearnPlan LDM Modifications

AP-4.1-04 - SCPM MODIFICATIONS

In cases where the Training Curriculum Designer modifies SCPM modules in the Navy CSDB due to changes in training requirements, the following alternate path will be applied. In most cases, it will be the Training Curriculum Designer working within AIM CPM that initiates SCPM module updates. However, there may be instances where an ISD may initiate changes in SCORM-based training content structures and requires modification to associated SCPMs. In such cases this alternate path may be performed by an ISD in coordination with the Training Curriculum Designer.

Step #	Step Description	Parent Path Re-entry Point	Relevant Business Rule
AP-4.1-04-1	Training Curriculum Designer checks out SCPM from Navy CSDB.		BR-4.1-06
AP-4.1-04-2	Training Curriculum Designer updates SCPM data in AIM CPM database.		
AP-4.1-04-3	Training Curriculum Designer transfers and checks in updated SCPM in Navy CSDB.		
AP-4.1-04-4	Training Curriculum Designer notifies Instructional Systems Designer of changes.	MP-4.1-21	BR-4.1-08

Table 5: Operational Scenario 1, Alternate Path 4- SCPM Modifications

4.2 Scenario 2: Post-Validation Revisions

This operational scenario consists of a main path, which may branch to and return from one alternative path or one exception path as depicted Figure 3. In this scenario, existing preliminary technical documentation is updated during or as result of system validation and verification. Learning Plan requirements and draft training content are also updated as a result of piloting modules or components within the training curriculum, or as final system configuration becomes known and validated for operation and maintenance (thus affecting final training requirements). Post-validation revisions to DM/LDM objects within the Navy CSDB may occur during the Production and Deployment Phase or Operations and Support Phase, as defined by the Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System for a procurement or operation and maintenance type of contract.

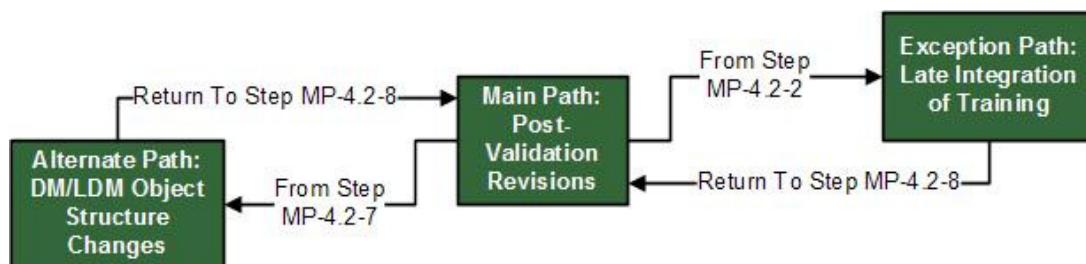The central governing function for all revisions is the

system configuration might not affect the corresponding training). Furthermore, tailoring may be required due to contractual requirements or other special or program-unique requirements.

4.2.1 Entry Criteria and Preconditions

Prior to starting the tasks required to revise technical documents and training content as an integrated data source, the following conditions are expected to have been met:

1. All four initial stages[8] of curriculum development defined in NAVEDTRA 130/131 (Series) are completed and a full pilot of the training curriculum has been conducted, instructor/trainee feedback documented and available to the TD&T IPT.
2. Preliminary Technical Documents have been reviewed and validated by all designated authorities (e.g., Engineers, SMEs, Technical Representatives), feedback has been documented and provided to the TD&T IPT.
3. An updated, if applicable, NTSP(s) for the

Figure 3: Path Relationship Summary for Operational Scenario 2

Technical Documentation and Training Integrated Product Team (TD&T IPT), which synchronizes the planning, production processes and products among the two groups. This operational scenario ends at the point in technical documentation and training development processes where ownership of all final products is transferred to the Navy.

NOTE: The steps within this operational scenario are not always linear but interrelated or iterative. Some steps may not be required (e.g., minor changes to

affected system(s) has been provided to the TD&T IPT.
4. The following Business Rules, defined in Section 4.1.2 of this document, have been

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[8] Within the NAVEDTRA 130/131 (Series), documents such as the Training Path System (TPS), Training Curriculum Control Document (TCCD), Lesson Plans, and Trainee Guides/materials are created, piloted for the first time, and red-lined across "Four Stages" of curriculum development, prior to entering Stage 5, which finalizes the given curriculum.

satisfied: BR-4.1-01, BR-4.1-02, BR-4.1-03, BR-4.1-04, BR-4.1-05, BR-4.1-06.

5. All review comments for technical documentation and training have been adjudicated and a final list of required revisions, additions, deletions has been generated and approved by Navy authorities.

6. All DM/LDM within the Navy CSDB are set to "Validation" status.

4.2.2   Business Rules

4.2.2.1   BR-4.2-01

SCO Workbench[9], because of its readily available implementation of the S1000D Bridge API, shall be the preferred training content authoring tool for accessing the Navy CSDB and performing all LDM training content development tasks (i.e., LDMs with S1000D Learn Event Code assignments of B through E).

4.2.2.2   BR-4.2-02

Once a SCORM content package is exported from the Navy CSDB, it enters the Navy e-Learning process for Government Content Acceptance Testing (GCAT) and hosting on the Navy's Learning Management System. It shall be the Curriculum Designer's and/or Instructional Systems Designer's responsibility to monitor content changes within the Navy CSDB and determine when an updated SCORM content package should be generated to update the Navy's LMS.

4.2.2.3   BR-4.2-03

SCORM content packages generated from the Navy CSDB shall use the S1000D Transformation Toolkit provided in the S1000D Bridge Tool Set.

4.2.2.4   BR-4.2-04

The Instructional Designer shall be responsible for notifying the Curriculum Developer of any changes

made to a DMRL that alters the LDM object structure within the Navy CSDB. The Curriculum Developer, upon receiving such notification, shall review the changes and verify alignment with the master Learn Plan maintained in AIM CPM. If necessary, the Curriculum Developer shall update the LearnPlan LDM maintained in the CSDB.

4.2.3   Main Path

Within the main path of the scenario described in Table 6, technical documentation and training content are revised concurrently within the Navy CSDB. Under this scenario, personnel only need to update objects (i.e., DM, LDM, SCPM, PM) within the Navy CSDB and re-export as IETMs, technical manuals, instructor materials, SCORM content packages, etc. This operational scenario ends at the point in the technical documentation and training development processes where products are transitioned to the Navy for official deployment and use.

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[9] Pending Authority to Operate within the DoD network.

Step #	Step Description	Alternate / Exception Path	Relevant Business Rule
MP-4.2-1	TD&T IPT convenes to review and assess impact of consolidated list of revisions, additions, deletions provided by Navy resulting from piloting of training courses/materials, and validation of technical documentation.		
MP-4.2-2	TD&T IPT conducts DMRL Review Workshop, updates and re-issues DMRL to content owners.	EP-4.2-01	
MP-4.2-3	Training Curriculum Designer checks out all affected SCPMs and LearnPlan LDMs from Navy CSDB prior to changing master copies in AIM CPM.		
MP-4.2-4	Training Curriculum Designer updates SCPM and LearnPlan LDMs in AIM CPM database.		
MP-4.2-5	Training Curriculum Designer transfers and checks in updated SCPM and LearnPlan LDMs in Navy CSDB.		
MP-4.2-6	Training Curriculum Designer notifies Instructional Systems Designer of completed changes to SCPM and LearnPlan LDMs.		BR-4.2-02
MP-4.2-7	Editor/Designer initiates DM/LDM revisions based on DMRL changes.	AP-4.2-01	
MP-4.2-8	Technical Writers revise DM content and notify Project Manager when complete.		
MP-4.2-9	Training Content Writers revise LDM content and notify Project Manager when complete.		BR-4.2-01
MP-4.2-10	Project Manager sets DMs status to "Review" stage in Navy CSDB.		
MP-4.2-11	Project Manager sets LDMs status to "Review" stage in Navy CSDB.		
MP-4.2-12	Engineers/Subject Matter Experts review DM/LDM content in Navy CSDB for technical accuracy.		BR-4.2-01
MP-4.2-13	Instructional Designers review LDM content for instructional integrity and ability to support related DM content.		
MP-4.2-14	Quality Assurance reviews all DM/LDM content for grammar, spelling, etc.		
MP-4.2-15	Project Manager sets "Final Write" project stage in Navy CSDB.		
MP-4.2-16	Quality Assurance verifies DM/LDM adjudication completed.		
MP-4.2-17	TMMA verifies PM in Navy CSDB. Updates PM, if required.		
MP-4.2-18	Documentation Publisher creates technical documentation products.		
MP-4.2-19	Instructional Systems Designer verifies SCPM in Navy CSDB. Updates SCPM, if required.		
MP-4.2-20	Programmer creates updated SCORM content packages for training.		BR-4.2-02 BR-4.2-03
MP-4.2-21	Project Manager sets project's DM/LDM to "Validation" stage in Navy CSDB.		
MP-4.2-22	TD&T IPT monitors and collects final validation from customer/end user organization.		
MP-4.2-23	Navy CSDB Administrator sets status of project to "End".		

Table 6: Operational Scenario 2, Main Path- Post-Validation Revisions

4.2.4   Alternate Path

AP-4.2-01- DM/LDM OBJECT STRUCTURE CHANGES

This alternate path is applied if the objects or object structure within the established Navy CSDB must be modified. For example, if a new training lesson was added as a result of the training pilot, then new LDM objects must be added to the CSDB and linked to the appropriate technical documentation DMs.

Step #	Step Description	Parent Path Re-entry Point	Relevant Business Rule
AP-4.2-01-01	Editor/Designer receives updated DMRL approved by TD&T IPT and identifies delta objects (i.e., those affecting current structure).		
AP-4.2-01-02	Editor/Designer updates DM/LDM object structure in Navy CSDB.	MP-4.2-8	

<p align="center">**Table 7: Operational Scenario 2, Alternate Path 1- DM/LDM Object Structure Changes**</p>

4.2.5 Exception Path

EP-4.2-01 - LATE INTEGRATION OF TRAINING

Under some programs separate contracts might be used to acquire technical documentation and training content. While not the ideal circumstance this exception path can be used under such situations to integrate the personnel, processes and tasks involved in producing technical documentation and training after the initial technical documentation DMs have been created in the Navy CSDB. This exception path modifies the optimal path of parallel technical documentation and training content production within the Navy CSDB to a successive one. It is assumed that learning plans, curriculum and training content have already been produced outside the Navy CSDB and have been piloted.

Step #	Step Description	Parent Path Re-entry Point	Relevant Business Rule
EP-4.2-01-01	TD&T IPT convenes to plan LDM integration planning workshop. Output is modified DMRL.		
EP-4.2-01-02	TD&T IPT conducts metadata review workshop. Output is revised metadata dictionary, if required.		
EP-4.2-01-03	Navy CSDB Administrator creates required user accounts for training personnel and assigns appropriate roles/access privileges to each.		
EP-4.2-01-04	Instructional Designer creates LDM objects in Navy CSDB.		
EP-4.2-01-05	Training Curriculum Designer loads LearnPlan information, derived from AIM CPM, into Navy CSDB.	MP-4.2-8	

<p align="center">**Table 8: Operational Scenario 2, Exception Path 1- Late Integration of Training**</p>

4.3 Scenario 3: Surveillance and Maintenance

This operational scenario consists of a single main path. There are no alternate or exception paths. In this scenario, technical documentation, training requirements, and training course content are updated in accordance with engineering changes and/or changes to training requirements. Surveillance of LDMs residing in the Navy CSDB is conducted via the S1000D Data Life Cycle Identification Service, provided as part of the S1000D Bridge Tool Set. The updates under this scenario are expected to occur during the Operations and Support Phase defined by the Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System for an operation and maintenance (i.e., "sustainment") type of contract.

4.3.1 Entry Criteria and Preconditions

There are several events that may trigger the need to revise learning plans and training materials. Such events may include any one or more of the following:

- Navy Training System Plan (NTSP) updates
- Safety performance assessments
- Fleet performance assessments
- Direct fleet input or requests
- Human Performance Requirements Review (HPRR)
- Revision to an Enlisted Occupational Standard (OCCSTD)
- Rating merger
- Establishment or revision of a Navy Enlisted Classification (NEC) code

There are several events that may trigger the need to revise technical documentation. The most common events are listed. Any one or more may result in the need to survey DMs in the Navy CSDB and update technical documentation.

- Engineering Change Notification that is accepted to modify the end system in some way.
  - Computer Program upgrades that change capabilities or functionality
  - Technology (Hardware/Firmware) refreshes or inserts
- Fleet identification of errors in technical documentation
- Fleet requests for additional procedures or related data

4.3.2 Business Rules

4.3.2.1 BR-4.3-01

The web service shall use the S1000D SNS in the DMC to create the nested interface of system component names and to identify the proper data modules to review. The SNS is a Logistical Control Number (LCN) that identifies the component discussed in the data module. The SNS is the configuration link between the data module and component it documents. The SNS must be compliant to the S1000D specification. The SNS can be based on the SNS tables located in the S1000D specification document unless special program circumstances prevent adherence to the specification's SNS table. Custom SNS tables can be developed.

4.3.2.2 BR-4.3-02

Only DMs and LDMs that require updates shall be copied from the stable area of the Navy CSDB into the project.

4.3.3 Main Path

Within the main path of the scenario described in Table 9, DMs and LDMS within the Navy CSDB are surveyed for impact due to a formal notification of technical data or training changes generated by the Navy. If data modules are impacted, the corresponding technical documentation, learning plans, training content or all three are revised as

output of this path. This operational scenario creates a new "project" within the Navy CSDB and ends with the issuance of updated products to the Fleet and/or training centers.

NOTE: The steps within this operational scenario are not always linear but interrelated or iterative. Furthermore, tailoring may be required to satisfy special or program-unique contractual requirements.

Step #	Step Description	Alternate / Exception Path	Relevant Business Rule
MP-4.3-01	Product Support Manager notifies TD&T Project Manager of changes to technical specifications and/or training requirements.		
MP-4.3-02	TD&T Project Manager provides change report to Training Curriculum Designer and Instructional Designer for impact assessment.		
MP-4.3-03	TD&T Project Manager establishes project area within the Navy CSDB and sets status of project to "Start Project".		
MP-4.3-04	TD&T Project Manager searches for DM/LDM in the Navy CSDB using metadata that associates the modified equipment with the DM/LDM.		BR-4.3-01
MP-4.3-05	TD&T Project Manager copies each DM/LDM that needs revision from the stable data section of the Navy CSDB into the newly established project.		BR-4.3-02
MP-4.3-06	Technical Writers revise DM content and notify Project Manager when complete.		
MP-4.3-07	Training Content Writers revise LDM content and notify Project Manager when complete.		
MP-4.3-08	Project Manager sets DMs status to "Review" stage.		
MP-4.3-09	Project Manager sets LDMs status to "Review" stage.		
MP-4.3-10	Engineers/Subject Matter Experts review DM/LDM content for technical accuracy.		
MP-4.3-11	Instructional Designers review LDM content for instructional integrity and ability to support related DM content.		
MP-4.3-12	Quality Assurance reviews all DM/LDM content for grammar, spelling, etc.		
MP-4.3-13	Project Manager sets "Final Write" project stage in Navy CSDB.		
MP-4.3-14	Quality Assurance verifies DM/LDM adjudication completed.		
MP-4.3-15	TMMA verifies PM in Navy CSDB. Updates PM, if required		
MP-4.3-16	TMMA creates technical documentation products.		
MP-4.3-17	Instructional Systems Designer verifies SCPM in Navy CSDB. Updates SCPM, if required.		
MP-4.3-18	Programmer creates updated SCORM content packages for training.		
MP-4.3-19	Project Manager sets project's DM/LDM to "Validation" stage in Navy CSDB.		
MP-4.3-20	TD&T IPT monitors and collects final validation from customer/end user organization.		
MP-4.3-21	Navy CSDB Administrator sets status of project to "End".		

Table 9: Operational Scenario 3, Main Path- Surveillance and Maintenance

5 Summary

This section of the CONOPS is provided to assist LCS MM Acquisition Managers and Product Support Managers plan for the key impacts and issues they will have to address to successfully integrate the technical documentation and training components of their programs. The integration of training data into a common technical data environment is likely unprecedented in the majority of programs. Over time, however, that should become less the case. The resulting shift in philosophy and practice from training planning and development being late life cycle activities isolated from technical documentation, to parallel and coordinated activities will generate significant program efficiencies and cost savings.

The S1000D Bridge Tool Set is provided to assist with the tactical level of implementation. Components of the Tool Set were integrated with specific applications (i.e., AIM CPM, SCO Workbench, Contenta®) to help training communities transparently merge their processes, people and tools into the technical data/documentation world. In the future, the APIs and web services at the core of the Tool Set may be integrated with other applications, as desired, by specific LCS MM training communities.

5.1 Navy Enterprise CSDB

5.1.1 S1000D Issue 4.0

S1000D is required of all LCS MM programs for technical data and documentation development. However, older issues of the specification are being used, which do not adequately support the needs of the training community. Acquisition Managers must ensure that the requirements for all LCS MM state that "S1000D Issue 4.0 or later" shall be used for the planning and development of technical data for documentation and training content.

5.1.2 Centralized CSDB Licensing

Localized instances of S1000D CSDBs are being used by technical documentation production groups. Such instances are often located at a contractor's site, Navy systems engineering and development site, Fleet concentration area, etc.

LCS MM Acquisition Managers shall require participation in a single Navy Enterprise CSDB licensing and publishing maintenance fee program. CSDB enterprise licensing is the annual cost for a single, individual account paid to the CSDB vendor by either the NAVAIR CSDB Administration group (NATEC San Diego) or NAVSSES CSDB Administration group (Philadelphia). As part of the acquisition process, an estimated number of licenses must be stated, and the respective NAVAIR NATEC or NAVSSES CSDB Point Of Contact (POC) must provide a quote on actual per user license cost for S1000D production. Licenses should be provided to contractors by the Government, not as an ODC cost on the contract.

Annual Navy CSDB maintenance fees are made by the specific LCS MM program to the NAVAIR or NAVSEA publishing center for network and account maintenance, and technical support. Inquiry on annual maintenance fees should be made to the NAVSSES or NAVAIR POC for S1000D production.

5.2 Technical Documentation and Training Integrated Product Team

LCS MM Product Support Managers must plan and emphasize the requirements to establish a joint Technical Documentation and Training Integrated Product Team (TD&T IPT). It is the central governing function that synchronizes the integration of requirements, planning, processes and products among all government and contractor stakeholders across an LCS MM program's Fleet training and support communities. Its charter is to establish and maintain common business rules, metadata

requirements and coordinated development of training content throughout all life cycle phases. Figure 4 provides an example of how the TD&T IPT's key membership and relationships may be designed for LCS MM programs.

The establishment of a joint government-contractor TD&T IPT will increase the responsibilities and time requirements of key government personnel. Therefore, it will be important that the Product Support Manager communicate the need, mission, and timeline to all desired participants as early in the process as possible. Synergy and the cost efficiencies to be gained through integrated data production and management will be magnified if key government stakeholders participate regularly.

5.3 Authority to Operate

In order to use the applications, web services and application programming interfaces provided within the S1000D Bridge Tool Set, Acquisition Managers and Product Support Managers must confirm that they are registered with the DoN Application and Database Management System (DADMS).   The developing agency for the Tool Set has taken initial steps to register the applications for approval with interim waiver but final approval should be sought by the LCS MM program to ensure remote access to the Navy CSDB will be granted from government and/or contractor owned systems.

5.4 Summary of Improvements

The single largest cost for training content is life cycle maintenance. The use of a centralized S1000D CSDB reduces ownership costs through the ability to quickly discover content that requires review according to system design or training requirement changes. Training content, stored in the same class of XML markup as other related information
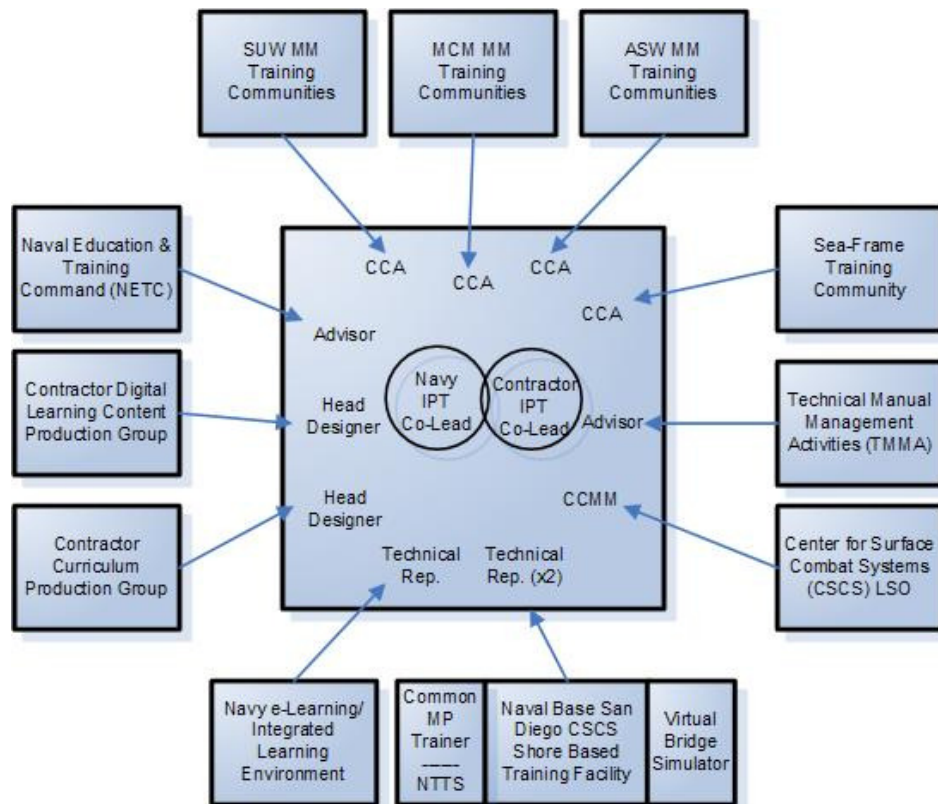
Figure 4: Example of TD&T IPT Membership and Structure

products, can be developed and maintained concurrently rather than as an addendum to support new or upgraded automated information or weapon systems. Reduced ownership costs become linked to readiness levels when data acquisition strategies are based on XML specifications, such as S1000D, designed for a particular community of practice. The Navy Enterprise CSDB, S1000D Bridge Tool Set, and implementation of S1000D Issue 4.0 together provide a pivotal strategy for centralized governance and standardized management of training content that is fully integrated into the life cycle management of the related data products in DoD environments.

Appendix A - Acronyms

AIM	Authoring Instructional Material
AIM LOM	AIM Learning Object Module
AIM CPM	AIM Content Planning Module
API	Application Programming Interface
ASW	Anti-Submarine Warfare
ATO	Authority To Operate
CBT	Computer Based Training
CCA	Curriculum Control Authority
CCMM	Course Curriculum Model Manager
CD	Curriculum Designer
CONOPS	Concept of Operations
CSDB	Common Source Database
DADMS	DoN Application and Database Management System
DLC	Digital Learning Content
DM	Data Module
DMRL	Data Module Requirements List
DoD	Department of Defense
DoN	Department of Navy
HSI	Human Systems Integration
ICW	Interactive Courseware
IETM	Interactive Electronic Technical Manual
ILE	Integrated Learning Environment
IMI	Interactive Multimedia Instruction
ISD	Instructional Systems Designer
LC	Learn Code
LCN	Logistical Control Number
LCS	Littoral Combat Ship
LCSP	Life Cycle Support Plan
LDM	Learning Data Module
LMS	Learning Management System
MCM	Mine Countermeasures
MM	Mission Module
NEC	Navy Enlisted Classification
NeL	Navy e-Learning
NETC	Naval Education and Training Command
NKO	Navy Knowledge Online
NTSP	Navy Training Systems Plan
OEM	Original Equipment Manufacturer
PM	Publication Module
R3	Reference, Re-use, Repurpose
RIT	Revolution In Training
R-TOC	Reduction in Total Ownership Costs
SCO	Sharable Content Object

SCORM	Sharable Content Object Reference Model
SCPM	SCORM Content Packaging Module
SNS	Standard Numbering System
SUW	Surface Warfare
TD&T (IPT)	Technical Documentation and Training (Integrated Product Team)
TMMA	Technical Manual Management Activities
TMMP	Technical Manual Management Program
XML	eXtensible Markup Language

Appendix B - Department of Navy Policy Implementation

Historically, programs have planned their acquisition of technical data and training content as separate components late in the product development and maintenance phases. Furthermore, programs have had no specific guidance or model for creating an integrated data management strategy. This CONOPS closes that gap and opens opportunities for programs to reduce their life cycle costs. When an integrated data management strategy is implemented as defined in this document, Operating and Support (O&S) costs can be lowered by harmonizing the processes, tools, infrastructure and data/media artifacts across all technical documentation and training development organizations contributing to a program. Specifically, this is achieved through:

1) Practical use case models and best practices designed to leverage the industry-based XML structures, metadata tagging, and configuration management protocols associated with implementing an S1000D common source database.
2) An S1000D Bridge Application Programming Interface (API) that allows training content development tools to connect directly with an authoritative S1000D common source database (CSDB).
3) An S1000D-SCORM Transformation Toolkit that extracts content directly from an authoritative S1000D CSDB to automatically create Sharable Content Object Reference Model (SCORM®) content packages.
4) A standardized S1000D Data Life Cycle Identification Service, which allows technical information managers to easily and accurately identify technical data and/or training content impacted by a proposed or implemented engineering change.

Product Support Managers assigned to the Littoral Combat Ship Mission Modules Program shall be the initial users of this CONOPS. However, the described processes, tools, standards and requirements create an integrated systems model that can be applied to the acquisition life cycle for any DoD program. This appendix explains how various NAVAIR and NAVSEA policies are implemented as a result of this CONOPS.

This CONOPS addresses the integrated acquisition, development and life cycle management of LCS MM operation and maintenance content used in training and technical documentation for an automated information or weapon system. The directives and guidance contained in this document shall be applied by all LCS MM personnel (i.e., government and contractor) to support the planning, analysis, design, development, implementation and evaluation of training and technical documentation. It shall be applied upon entering the Material Analysis Solution Phase, and continue through to the Operations & Support Phase defined by the Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System.

Implementation of Department of Navy S1000D Acquisition

NAVAIR Instruction 4120.11 states policy for the preparation and standardization of Naval Air Systems Command Interactive Electronic Technical Manuals (IETMs). This CONOPS document is in direct support of the Program's (i.e., Product Support Manager's) responsibility to acquire IETMs in accordance with S1000D for ACAT I and II programs, ensure interoperability, and eliminate "stove-piped" or proprietary solutions. It shall be used to augment the general guidance provided by NAVAIR and its DoD requirements, standards, and handbooks listed in 4120.11.

NAVSEA Instruction 4160.3A provides policy for the Naval Sea Systems Command's Technical Manual Management Program (TMMP), which applies to all technical publications or technical data products that furnish information on the description, installation, operation, test, maintenance, repair, and overhaul of a ship, system, equipment or component. The strategy defined in this CONOPS is in direct support of NAVSEA's requirement to "develop, publish, and maintain implementing policy, guidelines, and procedures for Command-wide management of technical manuals and operation of the TMMP." It augments, with a practical how-to approach, the ILS guidance set forth for Program Managers in NAVSEA S0005-AK-PRO-010 for acquiring TMs/IETMs in accordance with S1000D.

Implementation of Department of Navy Digital Learning Content Acquisition

DoD Instruction 1322.26[10] is applicable to all DoD Components and provides policies regarding the development, management and delivery of "Digital Learning Content (DLC)." It enforces DoD policies that direct DLC acquired by military components to be shared "to the maximum extent possible" and to "promote efficiencies by eliminating unnecessary duplication in the development of DLC." It also requires that a life cycle management strategy be identified and implemented.

In a March 2009 report[11] to the Secretary of the Navy, the Naval Inspector General reported various findings regarding SCORM-based training content delivered via the Navy's Learning Management

System (LMS) to satisfy various Sailor training requirements. It was, in part, a review of the Navy's strategic "Revolution In Training" (RIT) initiative, which established Navy e-Learning (NeL) through the Integrated Learning Environment (ILE) and made online learning content (i.e., SCORM-based CBT, WBT, IMI) accessible via Navy Knowledge Online (NKO). According to the report, the life cycle management of online courses and content was problematic due to "a lack of robust life cycle management practices" and an "inability to affect timely updates to CBT." A key recommendation was to centralize Navy online training content development and standardize life cycle management processes.

Following the Naval Inspector General's report, the Naval Education and Training Command (NETC) has since updated its manual for ILE Course Development and Life Cycle Maintenance (NAVEDTRA 136). In support of DoD and Navy business transformation priorities and strategies to enable intra-Navy sharing of learning data, and adopt commercial practices to reduce operating costs, all delivered training materials derived from authoritative technical data will be placed under NETC's life cycle management process. Its end-to-end process emphasizes the "reference, re-use, and re-purpose (R3)" of training content, requirements and authoritative source data. However, NETC states that the methods for "content repository and management "are the training content owner's responsibility. NETC does not define how training content will be managed or maintained by any given DoD Component. Furthermore, it only states that training and course materials may be linked to technical publications, and that "care must be taken to ensure that the materials are current."

This CONOPS provides methods and a tool set that is in direct alignment with DoD Instruction 1322.26 policies, and addresses training content life cycle

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[10] DoD Instruction 1322.26 was originally issued on June 16, 2006. At the time this CONOPS document was being produced, an update was in work. It is expected that the updated directives and policies in the new issue of this DoD Instruction will still be in alignment with that which is stated in this CONOPS.

[11] Naval Inspector General Report to the Secretary of the Navy: Computer Based Training (March 2009).

management and deployment process deficiencies identified by the Naval Inspector General. It provides training centers under NAVEDTRA 136 with the needed "how-to" solution for managing online courses, including their source content, media assets, and related technical documentation data. When followed, it will close gaps that prevent content reuse, cause redundant development efforts, and impede timely delivery of online training (i.e., IMI) that is as current as its related technical documents.

Appendix C - Content Development Systems Prior to CONOPS Implementation

The current Technical Documentation and Training content development and management system is two subsystems comprised of separate sets of people, processes and tools for creating interdependent technical products that support operation and maintenance tasks. In most cases, Original Equipment Manufacturers' (OEM) personnel create the initial technical documentation and training content as part of their development and production contracts. Upon transition of ownership to the government client, government organizations perform updates and maintenance on the technical documentation and training content as engineering changes or new training requirements occur. Government organizations often use contractor support but it may not be the same OEM or personnel that are contracted to update and manage the technical documents and training content.

Scope and Objective

Data management strategies for procurement begin in the Materiel Solution Analysis phase of acquisition, and evolve throughout later phases. The Acquisition Strategy for a program includes a Data Management Strategy, Human Systems Integration (HSI), and a Life Cycle Support Plan. All of these components of the Acquisition Strategy include activities related to the development of technical documentation and training content required to support the end users' operation and maintenance of the procured system. Engineering requirements and data are the "authoritative source" from which supporting documentation and training are derived. Training augments information and procedures established in validated technical documentation.

Although separate organizations, processes, policies, tools, etc. are used throughout the acquisition life cycle's phases, the common objective of technical documentation and training is to support development of users' knowledge, skills and abilities to operate and maintain the procured hardware and software in accordance with engineering specifications and the program's mission requirements. Together, they provide operators and maintainers with the core level of support required to deploy, operate and sustain an information or weapon system.

Description

As illustrated in Figure 5, the typical outputs of current technical documentation and training development processes are similar. During the analysis phase, requirements are defined in relation to the end operators' and maintainers' use of the system's capabilities, limitations, concept of employment, and program's mission objectives. Once requirements are established, design specifications are established. In the case of Technical Documentation for LCS MM, an S1000D-based Data Module Requirements List (DMRL) is created, which is then used by the S1000D CSDB Administrator to instantiate the necessary technical data "containers" to be populated by writers during the development phase. The requirements, processes, and business rules of these activities are governed by NAVAIR Instruction 4120.11 or NAVSEA Instruction 4160.3A.

As illustrated in Figure 6, NAVAIR LCS MM communities utilize a Navy-owned S1000D CSDB for technical documentation content management. NAVSEA LCS MM communities are also using S1000D CSDBs but technical documentation content production and management is not centralized to a single location.
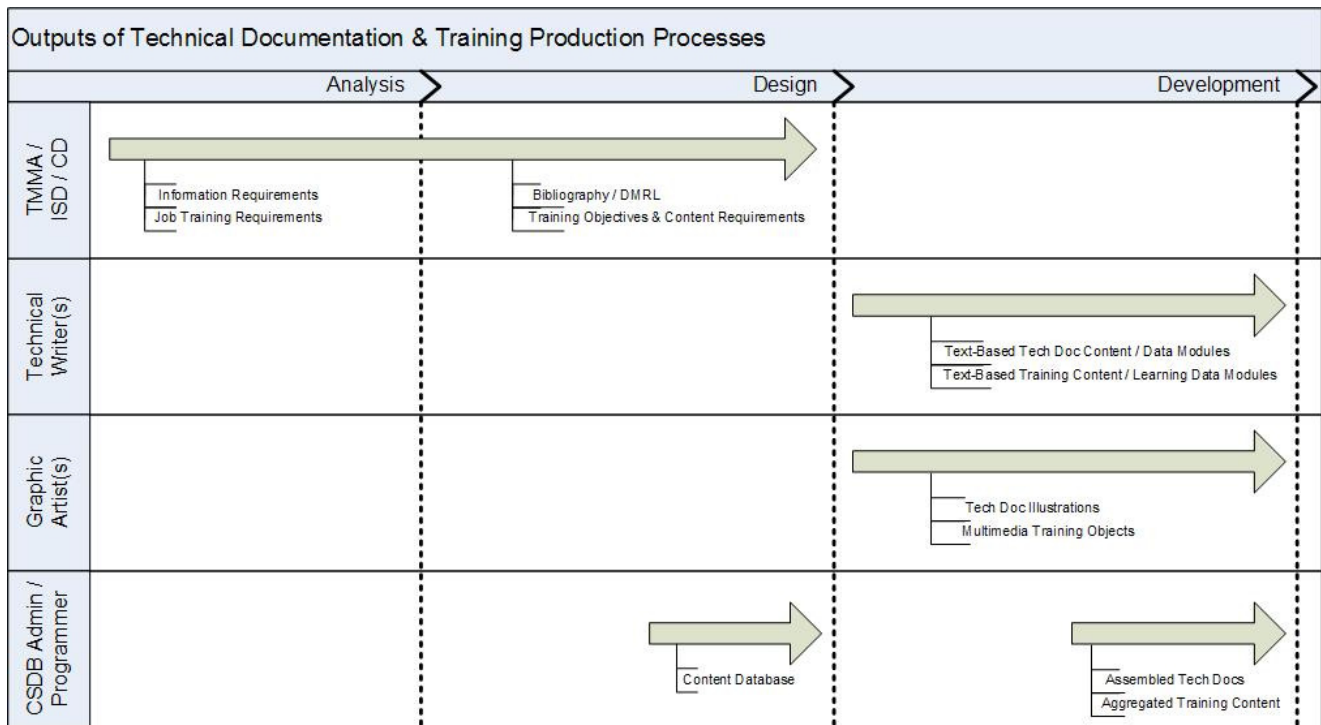
Outputs of Technical Documentation & Training Production Processes

	Analysis	Design	Development
TMMA / ISD / CD	Information Requirements / Job Training Requirements	Bibliography / DMRL / Training Objectives & Content Requirements	
Technical Writer(s)			Text-Based Tech Doc Content / Data Modules / Text-Based Training Content / Learning Data Modules
Graphic Artist(s)			Tech Doc Illustrations / Multimedia Training Objects
CSDB Admin / Programmer		Content Database	Assembled Tech Docs / Aggregated Training Content

Figure 5: Typical Outputs of Current Technical Documentation and Training Development Processes
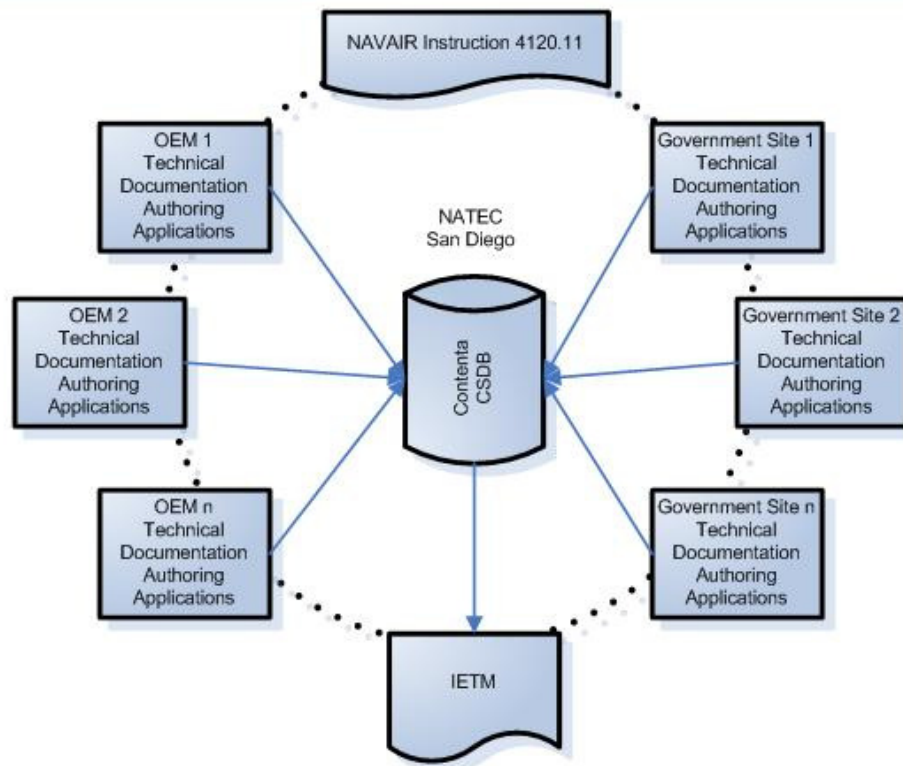

Figure 6: NAVAIR Technical Documentation Content Development System (LCS MM MH-60S Example)

There are multiple instances of CSDBs being used under different LCS MM programs, similar to the depiction seen in Figure 7.

objectives. Therefore, the Navy's ILE is not yet being used to host or deliver training content as part of current training system. The majority of content is
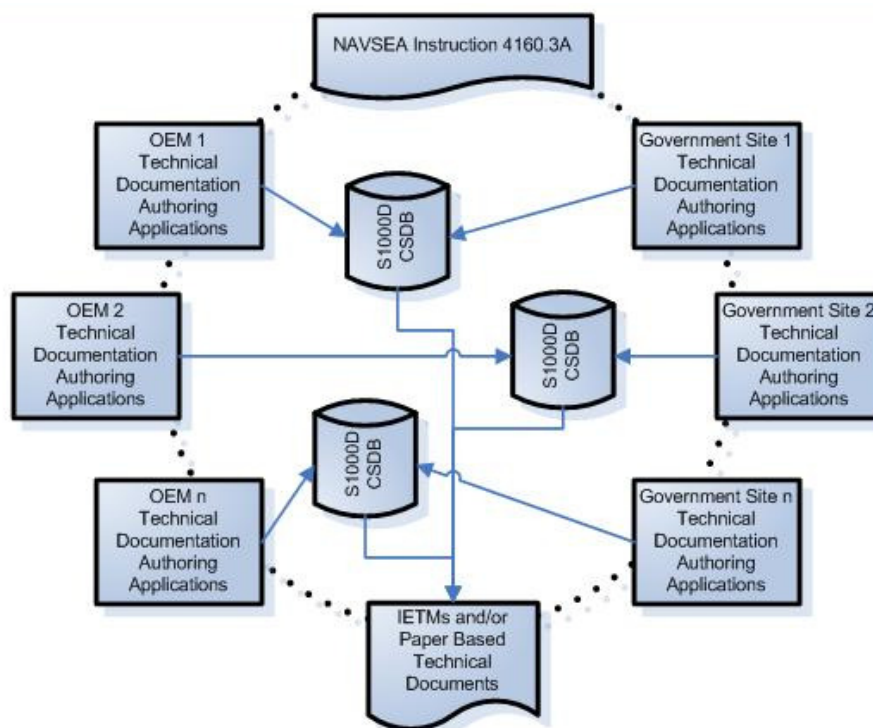

Figure 7: NAVSEA Technical Documentation Content Production System (LCS MM ASW, MCM, SUW Example)

LCS MM training is currently evolving and is being developed and delivered as "informal" training, per NETC's definition[12]. The majority of the training and supporting materials (e.g., instructor guides, lesson plans, PowerPoint presentations) are developed and delivered by the OEM's personnel as "factory" training for LCS MM crews. There is no standardized toolset, methodology or central management requirements in place. However, in some cases, curriculum is being planned and managed using the Navy's Authoring Instructional Materials (AIM) II application and database system for Task Based Curriculum (NAVEDTRA 130 Series).

There is minimal SCORM-based training content in use or being developed for current LCS MM training

delivered through traditional instructor-led courses conducted by OEM subject matter experts and engineers at sites local to where equipment is being manufactured, installed or tested.

As the various LCS MM systems and capabilities mature, it is expected that training will become formalized. As this occurs, the requirements of NAVEDTRA 136 will be placed on LCS MM training development and maintenance activities.

Organizations and Personnel Involved

Organizations directly involved with or that influence the current LCS MM technical documentation and training development systems include the following:

- Government Program Office PMS 420, PMS 495, and PMS 403

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[12] Refer to NETC Integrated Learning Environment Course Development and Life Cycle Maintenance, NAVEDTRA 136

- Naval Surface Warfare Center (Panama City Division, Dahlgren Division)
- Naval Air Training and Education Command (San Diego)
- Center for Naval Aviation Technical Training Unit (North Island NAS San Diego/Coronado)
- Various contractor/OEM suppliers' technical documentation and training departments under their ILS/Sustainment organizations

The following user classes exist across the involved organizations. The personnel types listed within a class have similar levels of responsibilities or authority within the overall technical documentation and training development processes.

Editor /Designer Class

- Technical Manual Management Activities (TMMA)
- Curriculum Designers (CD)
- Instructional Systems Designers (ISD)

Author Class

- Technical Writers
- Training Content Writers
- Graphic Artists

Reviewer Class

- Product Support Managers
- Project Managers
- Systems Engineers
- Subject Matter Experts
- Human Systems Integration / Human Factors Engineers
- Instructors/Trainers
- Quality Assurance

Administrative Class

- CSDB Administrators
- Programmers
- Documentation Project Managers

Appendix D - Detailed Description of Integrated Data Management System Architecture

The S1000D-based system is designed for technical documentation authors and instructional content developers to coordinate and maximize knowledge sharing, content reuse and life cycle management practices. The integrated data management and development system for technical documentation and training content is enabled by the S1000D Bridge Tool Set, which is comprised of:

- The S1000D Bridge API for connecting training content authoring tools to the CSDB.
- The S1000D-SCORM Transformation Toolkit for aggregating S1000D DM/LDM to create SCORM content packages. It may also be used to create applications to deliver content via iPhone/iPad and Android devices.
- A life cycle management web service that identifies all S1000D data modules for design change review

The system also includes graphics and multimedia development tools approved by the Navy. When content is developed in multimedia formats, S1000D LDMs/DMs references the content and applies the appropriate metadata and data module codes.

Objective and Scope

The proposed system centralizes dispersed technical documentation and technical training content development infrastructures for the Littoral Combat Ship Mission Modules Program into two regions: one for NAVAIR and one for NAVSEA. NAVAIR technical documentation and technical training content development infrastructure is centralized at North Island, San Diego, California. NAVSEA technical documentation and technical training content

development infrastructure is centralized at NAVSSES, Philadelphia, Pennsylvania. Initial Original Equipment Manufacturer (OEM) LCS MM technical documentation and training content developers have accounts in their respective NAVSEA or NAVAIR CSDB. The local NAVAIR and NAVSEA network and system administrative teams provide remote support to their respective developers for account management and system administration.

Localized management of LCS MM content development activities enables consolidated inventory accountability for all LCS MM digital data assets during development and life cycle support. OEM and other development contractors operate remotely and dial into their respective CSDB. Defined workflow processes coordinate all content planning, development and review activities between all organizations.

Description

The system is based on an S1000D-centric training content and technical information development strategy. The core system components are:

- A Navy enterprise-wide S1000D Common Source Database (CSDB)
- Government-owned Authoring Instructional Materials (AIM) Content Planning Module (CPM) tool for training requirements planning and design
- DoD-authorized training content development tools implementing the S1000D Bridge API and with Authority to Operate within the DoD network environment hosting the CSDB
- DoD-authorized technical documentation content development tools with Authority to Operate within the DoD network environment hosting the CSDB
- A DoD-authorized transformation application for extracting and aggregating

content into a SCORM content package, directly from the CSDB

- A DoD-authorized content surveillance web application implementing the S1000D Data Life Cycle Identification Service to search for affected LDMs/DMs directly within the CSDB.

Operational Policies and Constraints

Technical documentation content is developed according to respective and current SYSCOM policies; NAVAIR - 4120.11, NAVSEA - 4160.3A. NAVAIR and NAVSEA training content development are in accordance with NAVEDTRA 136.

Issue 4.0 of S1000D[13] is the technical documentation and training content format of choice for all LCS MM systems. NAVSEA and NAVAIR business rules are be developed and applied for technical documentation development.

All content developers develop and deliver a Data Module Requirements List (DMRL) in S1000D format that consist of all information data modules and learning data modules for respective projects prior to content development. With the exception of graphics and multimedia formats referenced by S1000D, non-XML formats such as Microsoft Word, PowerPoint and Adobe PDF are not used as managed source data formats.

OEMs coordinate with program offices and network support staff to create CSDB workflows that facilitate check-in/check-out procedures, development procedures and content verification and validation processes. Technical source documentation and training content are originated and managed from NAVAIR and NAVSEA CSDBs.

Training content developers use the S1000D-supported AIM CPM tool to plan training requirements, learning objectives and course or lesson structures. S1000D-supported SCO Workbench is the preferred application to develop training content according to requirements created in AIM. Arbortext™ Editor is the preferred application for technical manual and IETM development.

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[13] S1000D Issue 4.0 was the most current at the time this CONOPS was written. Issue 4.1 will provide additional LDM features that support training content development and shall be used when released and supporting technology is in place.

Appendix E - Referenced Documents

- DoD Instruction 5000.02 - Operation of the Defense Acquisition System
- Defense Acquisition Guidebook (DAG)
- DoD Instruction 8320.02 - Data Sharing in a DoD Net-Centric Environment
- DoD Instruction 1322.26 - Developing, Managing, and Delivering Digital Learning Content
- NAVAIR Instruction 4120.11 - Policy for Preparation and Standardization of the Naval Air Systems Command Interactive Electronic Technical Manuals
- NAVSEA Instruction 4160.3A - Technical Manual Management Program
- NAVEDTRA 136 - NETC Integrated Learning Environment Course Development and Life Cycle Maintenance
- Naval Inspector General Report to the Secretary of the Navy: Computer Based Training
- Advanced Distributed Learning (ADL) Initiative Report - A Technical Development Strategy for Bridging S1000D and SCORM
- International Specification for Technical Publications Utilizing a Common Source Database, S1000D Issue 4.0
- The Sharable Content Object Reference Model, SCORM 2004